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ISO 9001:2008
CONSULTANTS & TESTING CENTER

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**NABL ACCREDITED AS PER ISO/IEC 17025:2005**

Job No.: CECTC-BBMP-KRIDL-W.No.14-2015-16 : 18.04.2015

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | : **Executive Engineer,** Dasarahalli Division, BBMP, Bangalore. |
| Agency | : **Technical Manager (West),** KRIDL, PIU, Bangalore. |
| Name of Work | : Improvements to roads & drains at 1st, 2nd, 3rd, 5th & 6th Cross & other Cross Roads at Munikondappa Layout in Ward No. 14, Bagalagunte, BBMP, Bangalore. |
| Reference | : EE/DD/WO/374/2014-15 Dated: 31.03.2015 |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | : Bituminous Concrete |
| Date of Testing | : 18.04.2015 |

Result : Flakiness Index = **11.43%**

Elongation Index = **13.62%**

Result : Combined Flakiness & Elongation index **25.05%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

Note:

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Job No.: CECTC-BBMP-KRIDL-W.No.14-2015-16 20.04.2015

## Specific Gravity And Water Absorption Test
IS: 2386 Part III

| | |
|---|---|
| **Client** | **Executive Engineer,** Dasarahalli Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager (West),** KRIDL, PIU, Bangalore. |
| **Name of the Work** | Improvements to roads & drains at 1st, 2nd, 3rd, 5th & 6th Cross & other Cross Roads at Munikondappa Layout in Ward No. 14, Bagalagunte, BBMP, Bangalore. |
| **Reference** | EE/DD/WO/374/2014-15 Dated: 31.03.2015 |
| **Type of Mix** | Bituminous Concrete |
| **Date of Testing** | 20.04.2015 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 2056 | 1968 | 1997 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 755 | 755 | 755 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_s$ g | 1301 | 1213 | 1242 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2033 | 2009 | 2008 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_S)$ g | 732 | 796 | 766 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 2015 | 1996 | 1993 | |
| 7 | Specific Gravity | $W_4/(W_3-W_S)$ | 2.753 | 2.508 | 2.602 | 2.621 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_S)$ | 2.822 | 2.549 | 2.654 | 2.675 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 0.89% | 0.65% | 0.75% | 0.77% |

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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## NABL ACCREDITED AS PER ISO/IEC 17025:2005

Job No.: CECTC-BBMP-KRIDL-W.No.14-2015-16 20.04.2015

### Aggregate Gradation Test

IS : 2386 Part I

| | |
|---|---|
| **Client** | **Executive Engineer,** Dasarahalli Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager (West),** KRIDL, PIU, Bangalore. |
| **Name of the Work** | Improvements to roads & drains at 1st, 2nd, 3rd, 5th & 6th Cross & other Cross Roads at Munikondappa Layout in Ward No. 14, Bagalagunte, BBMP, Bangalore. |
| **Reference** | EE/DD/WO/374/2014-15 Dated: 31.03.2015 |
| **Sample I / D** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Bituminous Concrete |
| **Date of Testing** | 20.04.2015 |

Total Weight of Sample: **5475** gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | JOBMIX Gradation as per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 19 | 0 | 0 | 0 | 100 | 100 | Gradation satisfies Bituminous concrete Grade-II specification as per MORTH |
| 13.2 | 517 | 9.44 | 9.44 | 90.56 | 79 - 100 | |
| 9.5 | 543 | 9.92 | 19.36 | 80.64 | 70 - 88 | |
| 4.75 | 710 | 12.97 | 32.33 | 67.67 | 53 - 71 | |
| 2.36 | 645 | 11.78 | 44.11 | 55.89 | 42 - 58 | |
| 1.18 | 651 | 11.89 | 56.00 | 44.00 | 34 - 48 | |
| 0.600 | 667 | 12.18 | 68.18 | 31.82 | 26 - 38 | |
| 0.300 | 630 | 11.51 | 79.69 | 20.31 | 18 - 28 | |
| 0.150 | 328 | 5.99 | 85.68 | 14.32 | 12 - 20 | |
| 0.075 | 426 | 7.78 | 93.46 | 6.54 | 4 - 10 | |

Total Weight of Sample: **4825** gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | JOBMIX Gradation as per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 19 | 0 | 0 | 0 | 100 | 100 | Gradation satisfies Bituminous concrete Grade-II specification as per MORTH |
| 13.2 | 625 | 12.95 | 12.95 | 87.05 | 79 - 100 | |
| 9.5 | 465 | 9.64 | 22.59 | 77.41 | 70 - 88 | |
| 4.75 | 635 | 13.16 | 35.75 | 64.25 | 53 - 71 | |
| 2.36 | 510 | 10.57 | 46.32 | 53.68 | 42 - 58 | |
| 1.18 | 638 | 13.22 | 59.54 | 40.46 | 34 - 48 | |
| 0.600 | 513 | 10.63 | 70.18 | 29.82 | 26 - 38 | |
| 0.300 | 405 | 8.39 | 78.57 | 21.43 | 18 - 28 | |
| 0.150 | 416 | 8.62 | 87.19 | 12.81 | 12 - 20 | |
| 0.075 | 355 | 7.36 | 94.55 | 5.45 | 4 - 10 | |

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## NABL ACCREDITED AS PER ISO/IEC 17025:2005

Job No.: CECTC-BBMP-KRIDL-W.No.14-2015-16 20.04.2015

### BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

| | |
|---|---|
| CLIENT | **Executive Engineer,** Dasarahalli Division, BBMP, Bangalore. |
| AGENCY | **Technical Manager (West),** KRIDL, PIU, Bangalore. |
| NAME OF THE WORK | Improvements to roads & drains at 1st, 2nd, 3rd, 5th & 6th Cross & other Cross Roads at Munikondappa Layout in Ward No. 14, Bagalagunte, BBMP, Bangalore. |
| REFERENCE | EE/DD/WO/374/2014-15 Dated: 31.03.2015 |
| SAMPLE I/D | Sample Supplied by Agency |
| DATE OF TESTING | 20.04.2015 |

### BITUMEN CONTENT DETERMINATION

| Description | Sample 1 | Sample 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 469.5 | 470.5 |
| 3. Weight of Asphalt and Mineral matter Extracted, g | 30.5 | 29.5 |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | - | - |
| 6. Weight of Bitumen Extracted, g. (corrected) | 30.5 | 29.5 |
| 7. Bitumen content in % | 6.10 | 5.90 |
| 8. Average | **6.00** | |

### GRADATION AFTER EXTRACTION

TABLE - 1

| SIEVE SIZE | Percent Passing, % | | JOBMIX |
|---|---|---|---|
| mm | Sample 1 | Sample 2 | Gradation |
| 19 | 100.00 | 100.00 | 100 |
| 13.2 | 96.25 | 92.45 | 79-100 |
| 9.5 | 79.50 | 80.30 | 70-88 |
| 4.75 | 55.80 | 54.30 | 53-71 |
| 2.36 | 47.20 | 48.95 | 42-58 |
| 1.18 | 41.30 | 40.10 | 34-48 |
| 0.6 | 34.20 | 33.60 | 26-38 |
| 0.3 | 25.60 | 24.90 | 18-28 |
| 0.15 | 16.80 | 17.40 | 12-20 |
| 0.075 | 7.10 | 8.30 | 4-10 |

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Job No.: CECTC-BBMP-KRIDL-W.No.14-2015-16 20.04.2015

## TEST REPORT ON STABILITY OF MIX

| | | |
|---|---|---|
| **Client** | : | **Executive Engineer,** Dasarahalli Division, BBMP, Bangalore. |
| **Agency** | : | **Technical Manager (West),** KRIDL, PIU, Bangalore. |
| **Name of the Work** | : | Improvements to roads & drains at 1st, 2nd, 3rd, 5th & 6th Cross & other Cross Roads at Munikondappa Layout in Ward No. 14, Bagalagunte, BBMP, Bangalore. |
| **Reference** | : | EE/DD/WO/374/2014-15 Dated: 31.03.2015 |
| **Source of location** | : | Hot mix Plant, Bangalore |
| **Type of Mix** | : | Bituminous Concrete |
| **Date of Testing** | : | 20.04.2015 |

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

| Sl. No | Description | Test Result 1 | Test Result 2 | Requirement as per MORTH (Table 500-19) |
|---|---|---|---|---|
| 1 | Marshal Stability, Kn | 10.45 | 9.85 | 9 Kn (min) |
| 2 | Marshal flow, mm | 2.25 | 3.40 | 2 – 4 |
| 3 | Percent air voids in Mineral Aggregate | 14.10 | 13.30 | 13 – 15 |
| 4 | Voids in Compacted Mix | 5.15 | 4.70 | 3 – 6 |
| 5 | Percent Voids filled with Bitumen | 68.75 | 69.85 | 65 - 75 |
| 6 | Density, g/cc | 2.26 | 2.27 | -- |

Note:

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## TEST REPORT ON STABILITY OF MIX

| | | |
|---|---|---|
| **Client** | : | **Executive Engineer,** Dasarahalli Division, BBMP, Bangalore. |
| **Agency** | : | **Technical Manager (West),** KRIDL, PIU, Bangalore. |
| **Name of the Work** | : | Improvements to roads & drains at 1st, 2nd, 3rd, 5th & 6th Cross & other Cross Roads at Munikondappa Layout in Ward No. 14, Bagalagunte, BBMP, Bangalore. |
| **Reference** | : | EE/DD/WO/374/2014-15 Dated: 31.03.2015 |
| **Source of location** | : | Hot mix Plant, Bangalore |
| **Type of Mix** | : | Bituminous Concrete |
| **Date of Testing** | : | 20.04.2015 |

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

| Sl. No | Description | Test Result 1 | Test Result 2 | Requirement as per MORTH (Table 500-19) |
|---|---|---|---|---|
| 1 | Marshal Stability, Kn | 9.80 | 10.65 | 9 Kn (min) |
| 2 | Marshal flow, mm | 3.75 | 2.60 | 2 – 4 |
| 3 | Percent air voids in Mineral Aggregate | 13.50 | 14.85 | 13 – 15 |
| 4 | Voids in Compacted Mix | 4.65 | 5.20 | 3 – 6 |
| 5 | Percent Voids filled with Bitumen | 69.90 | 70.15 | 65 - 75 |
| 6 | Density, g/cc | 2.27 | 2.26 | -- |

Note:

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